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## Non-pharmacological Interventions for Alcohol, Marijuana, and Opioid Use During Pregnancy: A Systematic Review

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Non-pharmacological Interventions for Alcohol, Marijuana, and Opioid Use During Pregnancy:

A Systematic Review

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Author's Note

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### Abstract

The purpose of this review is to analyze evidence on prevalence of opioid, alcohol and marijuana use during pregnancy and answer the PICOT question: In pregnant women addicted to or using marijuana, opioids, and alcohol, how do non-pharmacological interventions, compared to standard care of pharmacological interventions alone, affect health outcomes in mothers and neonates from birth to hospital discharge? Diagnosis of substance use disorder among pregnant women is increasing and with it comes increased risk of complications to mother and neonate including neonatal abstinence syndrome (NAS), fetal alcohol syndrome (FAS) and other negative neonatal and maternal outcomes. Evidence was reviewed from the online databases, PubMed and CINAHL. Twenty studies from 2013-2018 were reviewed. Interventions included specialized comprehensive care, individual care, motivational interviewing (MI), and brief intervention. There was limited research about the topic, indicating a need for more research to find the most effective non-pharmacological interventions for these populations.

There is a rising substance abuse epidemic in the United States (Krans, Bobby, England, Gedeko, Change, Maguire, Genday, & English, 2018) that affects vulnerable populations who may be especially susceptible to health-related complications. This epidemic includes pregnant mothers abusing opioids, alcohol, or marijuana and their neonates affected by this abuse. Recent studies have shown that between 1998 and 2011, opioid use among pregnant women has increased 127% (Krans et al., 2018). A substantial number of women, against recommendations, continue to drink alcohol during pregnancy (Savory, Couves, & Burns, 2014). The rate of marijuana use has also significantly increased in the past 15 years (Coleman-Cowger, Oga, Peters, & Mark, 2018). Due to the increase of substance abuse in pregnancy, both the pregnant mothers and neonates are affected negatively (Krans et al., 2018).

Opioid related deaths from overdose have quadrupled since 1999 in the U.S., resulting in about 78 deaths per day (Metz, Brown, Martins, & Palamar, 2017). With the increase in opioid use in pregnant mothers, more children are being born with Neonatal Abstinence Syndrome (NAS) (Metz, Brown, Martins, & Palamar, 2017). Neonatal Abstinence Syndrome is a withdrawal syndrome exhibited by opioid-dependent neonates. This syndrome is characterized by a wide variety of signs and symptoms including feeding difficulties, tremors/seizures, high pitched cries, poor body temperature control, and other symptoms similar to that of opioid withdrawal (Patrick, Dudley, Martin, Harrell, Warren, Hatmann, & Cooper, 2018). Neonatal Abstinence Syndrome is extremely dangerous and can lead to neonatal deaths. Hospital costs for opioid addicted mothers and neonates have risen from \$32 million in 2009 to \$1.5 billion in 2012 (Metz, Brown, Martins, & Palamar, 2017). In reproductive-aged women, around one-third have a prescription for an opioid analgesic (Bakhireva, Shrestha, Garrison, Leeman, Rayburn, &

Stephen, 2018). It is evident that this problem is a significant crisis in the U.S. and calls for further attention, especially from nurses who manage the care of these women and neonates.

Alcohol consumption during pregnancy is important to study because it results in harmful risks in both mothers and neonates. Consumption of alcohol during pregnancy increases risk for certain fetal alcohol spectrum disorders (FASD), such as fetal alcohol syndrome (FAS), partial fetal alcohol syndrome, and alcohol-related neurodevelopmental disorder (May, Chambers, Kalberg, Zellner, Feldman, Buckley, Kopald, Hasken, Xu, Honerkamp-Smith, Taras, Manning, Robinson, Adam, Abdul-Rahman, Vaux, Jewett, Elliott, Kable, Akshoomoff, Falk, Arroyo, Hereld, Riley, Charness, Coles, Warren, Jones, & Hoyme, 2018). Approximately 30.3% of United States pregnancies are affected by prenatal alcohol exposure (PAE) (May et al., 2018). FASDs are associated with lifelong neurodevelopmental and behavioral disabilities in children, yet these disorders have received little attention in the research on prevention or treatment strategies (May et al., 2018).

Marijuana is one of the most commonly used illicit substances during pregnancy (Mark, Desai, & Terplan, 2015). Within the last decade, marijuana abuse in pregnancy has increased 35% (Mark, Desai, & Terplan, 2015). Use of marijuana during pregnancy increases risk in pregnancy and neonatal development. These risks include preterm labor, low birth weight, stillbirth, and neonatal intensive care unit admissions (Mark, Desai, & Terplan, 2015), as well as differences in neonatal behaviors (Coleman-Cowger, Oga, Peters, & Mark, 2018). These risks have been shown to decrease or become nonexistent with effective preventative interventions and treatments (Mark, Desai, & Terplan, 2015). Because the harms of marijuana use for a pregnant woman and her fetus have not been fully explored and the possibility of unknown side effects, The American College of Obstetricians and Gynecologists (ACOG) recommends that

pregnant women not use marijuana (2019). As marijuana use is legalized across the country (Mark, Desai, & Terplan, 2015), use in pregnant women may also increase, therefore research into adverse effects should be investigated.

Hospitals around the United States are seeing an increase in neonatal repercussions related to maternal substance use and abuse (Patrick et al., 2018). Pharmacological treatments are often supplied to wean mothers and neonates off addictive substances but these alone are not enough to treat these complicated addictions. While pharmacological interventions provide beneficial outcomes in treatment by minimizing withdrawal symptoms and cravings, they cannot help prevent relapse or provide patient education on maintaining a healthy lifestyle for both mothers and children (Andrews, Motz, Pepler, Jeong, & Khoury, 2018). Addiction is a multifaceted disease which requires a multifaceted approach to treatment. Mothers who used substances also need integrated, multi-faceted interventions to support the cessation of substance use during and following pregnancy (Andrews et al., 2018). To provide the most comprehensive care, evidence based non-pharmacological interventions need to be examined, critically appraised, and applied, in addition to the standard practice of pharmacological treatment (Andrews et al., 2018).

In this systematic review, evidence about the effects of supplemental non-pharmacological interventions, compared with pharmacological interventions alone, in pregnant mothers and neonates will be identified, reviewed, and critically appraised with practice recommendations advanced. The purpose of this review is to investigate evidence regarding the prevalence of opioid, alcohol, and marijuana use during pregnancy as well as nonpharmacological interventions to benefit neonate and mother. The following question will be answered: In pregnant women addicted to or using marijuana, opioids, and alcohol, how do

supplemental non-pharmacological interventions, compared to standard care of pharmacological interventions alone, affect health outcomes in mothers and neonates between birth to hospital discharge? This is relevant to the nursing community due to the increase in diagnoses of substance abuse disorder (Patrick et al., 2018) in women and the increase in negative outcomes for neonates due to exposure to both licit and illicit substances (Andrews et al., 2018). Recent studies from the Center of Disease Control and Prevention (CDC) ("Substance Use During Pregnancy," 2019) have shown that from 1999 to 2014 opioid use in pregnancy has quadrupled. Along with this, it is proved that alcohol use in pregnancy has shown long term effects on neonates, including a variety of Fetal Alcohol Disorders (FADs) ("Fetal Alcohol Spectrum Disorders...", 2018). There is still little research done on marijuana use during pregnancy; common known effects are low birth weight and problems concentrating as the neonate grows older ("What You Need to...", 2018). These facts further support and advocate for the need for nurses to gain knowledge of this subject and more research to be done.

### **Methods**

The articles used for this systematic review were carefully selected using a strict inclusion and exclusion criteria. Only articles published from 2012-2018 were considered to review the most current research. Articles were examined to ensure they were peer-reviewed, and findings were evidence-based. Journals and articles were selected based on credibility and relevance to the PICOT question. Preference was given to nursing journals.

The population focus of this systematic review is pregnant women with substance abuse and affected neonates. While selecting articles, only articles with the primary population being substance abusing pregnant women and affected neonates were used. Studies were not limited to research conducted in the United States, as research conducted in other countries has generated

relevant evidence for practice in the U.S. Articles focusing on pharmacological methods of treating addicted women were not considered. Since this review is centered on nonpharmacological approaches, research about various therapies and alternative methods were selected.

When searching for articles, a variety of databases were used including PubMed and CINAHL. These databases heavily focus on nursing research. An openness to inconsistencies and contradictions in findings, extensive research into various topical possibilities and use of diverse keywords in each database search engine were implemented in selection of articles to ensure that the review is comprehensive and as unbiased as possible. Keywords included: “pregnant”, “women”, “addiction”, “treatment”, “therapy”, “substance abuse”, and other specific substances. When searching for research articles based solely on marijuana intervention, studies were very difficult to find and should be noted as implication for future research.

In the critical analysis of each article, it was necessary for the content to be clear and concise for consideration in this systematic review. Studies must have used reliable, adequate samples or explanation of sample inclusion and exclusion criteria. The articles must meet the strict criteria of this review as mentioned above, and should discuss limitations, especially those affecting generalizability and show minimal bias.

The content of each article was critically analyzed, leading to the decision to include them in this systematic review based on inclusion parameters stated above. However, it was difficult to find many studies answering the PICOT question. Therefore, almost all relevant studies about interventions for pregnant women addicted to substances were utilized throughout this systematic review. As more research is done on this prevalent issue, increased understanding will be generated about the effectiveness of interventions.



## Review of Literature

### Opioid Abuse

**Prevalence.** Several studies were found regarding opioid use during pregnancy. Two focused on cohorts to find prevalence of opioid use in pregnant women. In general, researchers agreed that opioid use during pregnancy is a growing problem that needs to be addressed. Angellota, Weiss, and Friedman (2016) found that in 2012, roughly 1.2% of pregnant women in the United States are addicted to opioids. These researchers found a positive correlation between unintended pregnancies and opioid use. Additionally, Metz, Brown, Martins, & Palamar (2017) found that since 1999, opioid overdose resulting in death has quadrupled. Polysubstance abuse is another problem many pregnant women are dealing with. Metz, Brown, Martins, & Palamar (2017) found that of pregnant women with substance abuse disorder (n=818), 36.8% (n=281) used opioids exclusively, 28.2% (n=241) were polysubstance users, and 35.0% (n=296) used non-opioid illegal substances. Limitations in this study include unaccounted for trends, exclusion of institutionalized women, and the inability to infer causality. Nørgaard, Nielsson, & Heide-Jørgensen (2015) found that out of 950,172 Danish women, 557 (5.9%) were tested positive for opioid use. Exclusive use of the opioid buprenorphine occurred in 167 pregnancies, and exclusive use of the opioid methadone occurred in 197 pregnancies. Twenty-eight women reported using heroin only, and 165 used a combination (Nørgaard, Nielsson, & Heide-Jørgensen, 2015). These two studies clearly show that polysubstance abuse in pregnancy is a significant problem. The number of people who developed Opioid use disorder (OUD) has gotten so high that the U.S. Department of Health and Human Services (HHS) has declared a public health emergency in 2017 (“What is the U.S. Opioid Epidemic?” 2019).

**Prevalence and outcomes in newborns.** The increasing prevalence of pregnant women with OUD has led to an increase in neonates born with Neonatal Abstinence Syndrome (NAS; Metz, Brown, Martins, & Palamar, 2017). Because the effects of opioids travel to the neonates through the placenta, neonates are at risk for NAS and other adverse reactions (Nørgaard, Nielsson, & Heide-Jørgensen, 2015; Patrick et al., 2015). For example, in a sample of 950,172 pregnant women, the median birth weights for neonates affected by opioid addiction during pregnancy (n=557) were less than the median birth weight of neonates that were not affected (n=949,615) (Nørgaard, Nielsson, & Heide-Jørgensen, 2015; Patrick et al., 2015). Nørgaard, Nielsson, & Heide-Jørgensen (2015) also found genital malformations in 46 of the neonates affected by addiction to opioids during pregnancy. Preterm delivery was prevalent in opioid exposed neonates (Nørgaard, Nielsson, & Heide-Jørgensen, 2015), as well as respiratory disease, jaundice, and problems with feeding (Patrick et al., 2015). Patrick et al. (2015) findings are limited due to potential errors in medical records, not knowing if mothers were taking their prescription opioids as prescribed, and the inability to account for any illegal substances that may have been used during the trial. Nørgaard, Nielsson, & Heide-Jørgensen, (2015) and Patrick et al. (2015) both found that opioid exposed neonates are more susceptible to complications than non-opioid exposed neonates, and that NAS negatively impacts neonatal development.

According to the CDC, in the latest data available reported in 2014, a neonate is born with NAS every 15 minutes (“Pregnancy: Neonatal Abstinence Syndrome,” 2019). This is nearly 100 babies a day; about 32,000 babies a year (“Pregnancy: Neonatal Abstinence Syndrome,” 2019).

**Nursing interventions.** Researchers have examined the effects of various interventions to decrease the use of opioids in pregnant women and decrease the negative impact on their neonates. For example, four studies were found on interventions for mothers and neonates

affected by opioid use disorder; two studies were about specialized comprehensive care interventions (Andrews et al., 2018; Krans et al., 2018) and two were about individual interventions (Howard, Schiff, Penwill, Si, Rai, Wolfgang, Moses, & Wachman, 2017; Lander, Gurka, Marshalek, Riffon, & Sullivan, 2015). In general, the interventions found to be most effective in mothers and their neonates involved specialized comprehensive care that included treatment of addiction (Andrews et al., 2018; Howard et al., 2017; Krans et al., 2018; Lander et al., 2015), prevention of relapse (Andrews et al., 2018; Krans et al., 2018; Lander et al., 2015), patient education (Andrews et al., 2018; Howard et al., 2017), and maintaining healthy mother-child relationships (Andrews et al., 2018; Krans et al., 2018; Howard et al., 2017). Pregnant women who participated in specialized comprehensive interventions were more likely to attend postpartum visits (67.9% vs 52.6%; intervention group n=71, control group n=177; Krans et al., 2018), have increased rates of breastfeeding during childbirth hospitalization (14.7% vs. 37.0%; Krans et al., 2018), receive long-acting reversible contraceptive methods following deliveries of neonates (23.9% vs. 13.0%; Krans et al., 2018), maintain custody of their children (60.6%; n=160; Andrews et al., 2018), and end services with goals met if they attended services with regular frequency (18.8%; Andrews et al., 2018). Howard et al. (2017) found that parental presence also known as rooming-in was documented at 68% (n=86) and the mean Neonatal Abstinence Syndrome (NAS) was significantly lower in neonates who were breastfed. A 100% parental presence was significantly associated with a one point decrease in the mean NAS score (-0.52 to -0.15), a nine day decrease in the length of stay (-0.48 to -0.10), and eight fewer days of opioid therapy (-0.52 to -0.15; Howard et al., 2017). Findings from these studies support the continuous need for new non-pharmacological interventions to be implemented into healthcare.

**Alcohol Abuse**

**Prevalence.** Researchers have examined the prevalence of alcohol abuse in pregnant women. Two studies were found on the prevalence of alcohol consumption during pregnancy. Researchers have examined cross-sectional data on prevalence (Savory, Couves, & Burns, 2014) as well as prospectively on prevalence in both alcohol use disorder in correlation with other substances (Bakhireva et al., 2018). In general, researchers have found that prevalence of alcohol abuse in mothers ranged from 8.5% to 30.3% (Bakhireva et al., 2018). In a cross-sectional survey of pregnant women (n=470), Savory, Couves, and Burns (2014) found that 74% reported no drinking in the past 3 months, 18% reported monthly drinking or less, and 7.8% reported frequent drinking. This survey sample comprised of pregnant women attending their first antenatal appointments during an estimated 10-11 weeks gestation (Savory, Couves, & Burns, 2014). Alcohol consumption is prevalent early in pregnancy as well in the periconceptional period. In a study of 660 pregnancies, Bakhireva et al. (2018) found that 15% of pregnant women (n=660) consumed on average at least three drinks per week, consistent with the national report of 8.5% to 30.3% prevalence for alcohol use during pregnancy (Bakhireva et al., 2018). Findings from both studies support the need for more interventions and education provided for patients suffering from these conditions.

**Prevalence and outcomes in neonates.** Studies have been done to examine the prevalence of alcohol abuse in pregnancy and the outcomes in neonates; two studies were found relevant to this systematic review. Researchers have studied prevalence by using an active-case ascertainment with a cross-sectional design (May et al., 2018) and in a case study regarding one school of students (Lubbe, Walbeek, & Vellios, 2017). Lubbe, Walbeek, & Vellios (2017) found an increase prevalence of adverse outcomes in newborns, such as Fetal Alcohol Syndrome. May et al. (2018) found no increase in prevalence. There are some inconsistent findings reported by

the two groups of researchers. Lubbe, Walbeek, & Vellios (2017) reported prevalence of fetal alcohol disorder at 12.7% (127 per 1000 people) in a sample of 166. These findings are inconsistent with May et al., (2018) who found estimated prevalence as a wide range of 9.7 to 50.4 per 1000 children (n=6639), which is comparable to the national average and a decrease from the findings from Lubbe, Walbeek, & Vellios (2017). Reasons to why this may be is that Lubbe, Walbeek, & Vellios (2017) focused mainly on fetal alcohol disorder while May et al. (2018) focused on the full spectrum of alcohol causing disorders. A major limitation of the case study (Lubbe, Walbeek, & Vellios, 2017), compared to the cross-sectional study (May et al., 2018), is that it would be difficult to compare findings to other studies since it only focused on Fetal Alcohol Disorder specifically. It also had a small sample of 166 students in one area of South Africa, which could influence the results (Lubbe, Walbeek, & Vellios, 2017). Even though there is a difference in prevalence in findings in these two studies, it is still essential for new interventions to be put in place to decrease the long term and harmful effects of alcohol use during pregnancy.

**Nursing interventions.** Researchers have examined a diverse set of interventions for pregnant women who use alcohol during pregnancy, such as motivational interviewing (MI; Osterman, Carle, Ammerman, & Gates, 2014; Rendall-Mkosi, Morojele, London, Moodley, Singh, & Girdler-Brown, 2012) and brief interventions of counseling. All aimed to decrease the risk of alcohol consumption during pregnancy (Kaner, Bland, Cassidy, Coulton, Dale, Deuca, Gilvarry, Godfrey, Heather, Myles, Newbury-Birch, Oyefeso, Parrott, Perryman, Phillips, Shepherd, & Drummond, 2013). In general, researchers have found that multiple sessions of MI, which is a holistic approach to counseling aimed at helping individuals make choices about behavior, had positive results in decreasing alcohol consumption during pregnancy (Osterman et

al., 2014; Rendall-Mkosi et al., 2012). The effectiveness of MI increased when used longer than one-month duration whether during pregnancy or in anticipation of pregnancy (Rendall-Mkosi et al., 2012). For example, in a sample of 165 women aged 18-44 years, researchers found that a five session MI intervention was effective for women at risk for giving birth to neonates with FAS. Regular implementation of MI was also found effective as part of routine pregnancy care (n=165; Rendall-Mkosi et al., 2012). In contrast, a single session MI intervention was not effective in decreasing alcohol consumption (N=122; Osterman et al., 2014). Two 15-minute brief interventions of brief counseling, provided by a physician with follow-up phone calls (N=3562; Kaner et al., 2013), were found to be an ineffective intervention to decrease alcohol consumption. In summary, MI, a theory-based intervention, when used to decrease maternal intake of alcohol before and during pregnancy, has been used effectively when women attend multiple sessions although the specific reason for success has yet to be investigated (Osterman et al., 2014).

### **Marijuana Abuse**

**Prevalence.** Researchers have found recent increases in marijuana use in women of childbearing age. In general, that marijuana abuse among women of childbearing age increased by 35%, according to hospital admission records from 1998 to 2003 in the United States (Mark, Desai, & Terplan, 2015). From 2005-2014, Coleman-Cowger, Oga, Peters, & Mark (2018) found that 1% of pregnant women in the United States admitted to marijuana use. However, the actual number of users could be higher, because perhaps pregnant women under-report use because of social desirability and fear that parenting may be questioned. Mark, Desai, & Terplan (2015) found that pregnant marijuana users were less likely to graduate from high school and

more likely to be unemployed than those who had a negative marijuana screen. They were also more likely to report feelings of depression.

In a study of 396 pregnant women, Mark, Desai, & Terplan (2015) found that 116 of these women tested positive for marijuana during prenatal care, and only three produced a positive toxicology screen at the time of delivery. There is a lack of research on the prevalence of marijuana use in pregnant women, however, those studying this problem have found slight increases in marijuana use among pregnant women.

**Prevalence and outcomes in neonates.** Few researchers have examined the effects and outcomes in newborns who are exposed to marijuana abuse prenatally. Those who have researched this problem have looked at developmental effects on neonates into childhood using a retrospective cohort study (n=6,841; Warshak, Regan, Moore, Magner, Kritzer, & Van Hook, 2015) and a secondary analysis of randomized-controlled trial (n=1867; Dotters-Katz, Smid, Manuck, & Metz, 2017). Researchers have studied the neonatal adverse outcomes of preterm delivery (Warshak et al., 2015), preeclampsia (Warshak et al., 2015), gestational diabetes (Warshak et al., 2015), cesarean delivery (Warshak et al., 2015), fetal growth restriction (Warshak et al., 2015), perinatal mortality (Warshak et al., 2015), childhood and neonatal morbidity (Dotters-Katz, Smid, Manuck, & Metz, 2017), periventricular leukomalacia (Dotters-Katz, Smid, Manuck, & Metz, 2017), and bronchopulmonary dysplasia (Dotters-Katz, Smid, Manuck, & Metz, 2017). In general, researchers found no increased risk of severe negative obstetrical outcomes in newborns with the use of marijuana use during pregnancy (Warshak et al., 2015). In a secondary analysis, researchers found that in a sample of 1867, 138 (7.2%) were exposed to marijuana use during pregnancy (Dotters-Katz, Smid, Manuck, & Metz, 2017); no differences were noted in neonatal or childhood outcomes in unexposed marijuana pregnancies

versus pregnancies exposed to marijuana. Future researchers should continue studying prevalence and effects of marijuana use in pregnant women on these and other longer-term outcomes.

**Nursing interventions.** As previously mentioned, despite repeated search efforts, only one intervention study of pregnant women using marijuana was found. This may be due to polysubstance abuse rather than solely marijuana abuse in pregnant women. Increase in research to study the effects of marijuana through intervention studies is anticipated as legalization of marijuana increases in the United States. Gray, Beatty, Svikis, Puder, Resnicow, Konkel, & Ondersma (2017) studied the effects of motivational interviewing (MI) techniques through electronic brief messaging and found that MI was effective in this population. Using a small sample of ten pregnant women, the researchers found that 9 out of 10 women reported that the intervention caused them to be more likely to decrease their marijuana use during pregnancy. Overall, more research is needed involving non-pharmacological interventions for mothers and neonates affected by marijuana use as it becomes more prevalent in healthcare in the future.

### **Critical Appraisal of Evidence**

**Limitations.** Although there is accuracy of this systematic review, it is not without limitations. A limitation of this review is the lack of articles provided; specifically, information found regarding the use of marijuana during pregnancy. Twenty journals were reviewed and compared. There was limited research found on the nonpharmacologic interventions used on mothers abusing marijuana during pregnancy. Also, information was not limited to studies inside the United States. Two studies were used from Denmark (Nørgaard, Nielsson, & Heide-Jørgensen, 2015) and South Africa (Lubbe, Walbeek, & Vellios, 2017) to support this systematic



review. Journals were searched with CINAHL and PubMed but some valuable journals found were required to be purchased. This is a limitation in the review. Findings of the review may be limited due to the fact only published and readily available journals were used. Journals were searched back to 2012 in order to find at least 20 published writings. This limitation could alter the information as to be outdated. Since this review group had a total of four (4) researchers, it is appropriate to speculate that while searching for relevant articles, personal bias or opinions on certain studies could have been present. It is correct to assume every researcher is different in the selection of consistent articles.

**Reliability & Validity.** The most common design method that was found was retrospective cohort (Warshak et al., 2015; Mark, Desai, & Terplan et al., 2015; Howard et al., 2017; Krans et al., 2018; Patrick et al., 2018; Nørgaard, Nielsson, & Heide-Jørgensen, 2015). In a retrospective cohort, researchers investigate past studies or occurrences to determine possible causative factors. Limitations of this type of design include that they are viewing this information after the actual event of recording and that the researchers cannot definitively say that the independent variable caused the dependent variable. Therefore, all conclusions are based in probability and likelihood.

Randomized control trial (Dotters-Katz, Smid, Manuck, & Metz, 2017; Lander et al., 2015; Osterman et al., 2014; Rendall-Mkosi et al., 2012; Kaner et al., 2013) is a method design where participants are assigned to either an interventional group or control group. This type of design is performed in a controlled setting, targeting a specific nursing intervention, and has a measurable outcome. Limitations to this type of design include participation bias, being that the volunteered participants may not be a correct representation of the targeted population as a whole.

Another methodology used was cross-sectional design (Savory, Couves, & Burns, 2014; May et al., 2018; Coleman-Cowger, Oga, Peters, & Mark, 2018; Metz, Brown, Martins, & Palamar, 2017). Cross-sectional design uses observation to compare the results of different participants at the same time. Advantages of this design include that researchers can compare outcomes quickly and that readers get information on prevalence of outcomes and/or exposure. They are especially helpful in establishing a baseline in cohort studies and in planning cohort studies. However, no design is perfect, and the cross-sectional design is no exception.

The next design methods that will be discussed were seen less than the prior design methods. A case study design was observed (Lubbe, Walbeek, & Vellios, 2017). In this type of design researchers focus on a single patient or community. Detailing diagnosis, nursing care, and environmental factors. In this type of method, researchers directly observe their subject. A great limitation to this type of method is the small amount of data it collects specifically on one patient or community, causing it to be less reliable than others. Another design method used was prospective cohort (Bakhirva et al., 2018). A prospective cohort study is a longitudinal cohort study that follows a group of individuals over time, often for years, to determine how different factors affect rates of outcomes. Relative to the other observational study designs, prospective cohort studies hold the strongest level of evidence. Advantages of this design include the extended length of the observation. Researchers are able to collect more evidence regarding their subject of study and possibly discover data that would not have been found had the study been for only weeks as compared to years.

Another design method used was quasi-experimental (Andrews et al., 2018). Quasi-experimental studies are similar to experimental design studies with the exception of using a non-randomized cohort. This means that is weaker than the standard experimental study but is

more reasonable to complete in a healthcare study. While quasi-experimental studies are weaker, they provide a good starting point to see the beginning of causality. Another design method used was logistic regression analysis (Angelotta, Weiss, Angelotta, & Friedman, 2016). This method is used to estimate a data value based on past observations of a data set. It examines the link between one or more present independent variables whilst predicting a dependent variable. A limitation to this specific method is it is unable to predict continuous outcomes.

The design methods and findings of the studies are reliable due to the fact that most of the studies analyzed showed similar results. A majority of these studies showed negative outcomes between using marijuana, opioids, or alcohol during pregnancy as well as provided more information on neonate and mother outcome while using these illicit substances (Angelotta et al., 2016; Nørgaard, Nielsson, & Heide-Jørgensen, 2015; Andrews et al., 2018; Kaner et al., 2013; Rendall-Mkosi et al., 2012; Osterman et al., 2014; Lander et al., 2015; Lubbe, Walbeek, & Vellios, 2017; Patrick et al., 2018; Krans et al., 2018; Howard et al., 2017; Mark, Desai, & Terplan et al., 2015; Bakhirva et al., 2018; Warshak et al., 2015; Metz, Brown, Martins, & Palamar, 2017; May et al., 2018; Savory, Couves, & Burns, 2014). Only one study showed no negative effect on neonate or mother outcome on use of marijuana during pregnancy (Dotters-Katz, Smid, Manuck, & Metz, 2017). Overall, all studies evaluated have shown a need for attention and further research in this area.

Savory and colleagues (2013) surveyed pregnant women to report their amount of drinks of alcohol per day consumed. The study did not specify what the term “drink” meant. This meaning, what one participant would consider moderate consumption of alcohol could be what another participant considers excessive. Therefore, this could skew the results on the exact

amount of alcohol consumption during pregnancy (Savory et al., 2013). Similar limitations across studies included social desirability and personal bias. These studies speculated that their subjects may have lied about marijuana, alcohol, and opioid use during pregnancy due to fear of being stigmatized and looked down upon by the researchers or peers (Bakhireva et al., 2018; Mark., Desai, & Terplan, 2015; Metz, Brown, Martins, & Palamar, 2017; and Rendall-Mkosi et al., 2012). Research bias was a similar limitation found across studies. Some studies only included non-institutionalized pregnant woman, causing an underrepresentation of the population (Metz, Brown, Martins, & Palamar, 2017). Small sample sizes lead to lack of generalization of the data found in the studies and is common in health care studies due to not enough resources or time for a study with a large number of participants to take place (May et al., 2018; Howard et al., 2017). Due to the large number of retrospective cohort studies, errors of omission and commission were also common (Warshak et al., 2015; Mark, Desai, & Terplan et al., 2015; Howard et al., 2017; Krans et al., 2018; Patrick et al., 2018; Nørgaard, Nielsson, & Heide-Jørgensen, 2015). Errors of omission means the information that was gathered from the past in the retrospective cohort may have been left out. In comparison, errors of commission means that the information available may have been put in incorrectly. This causes a mishap in data collection as a whole.

### **Synthesis of Evidence**

The results of this systematic review is that eight (8) of the articles involved focused on opioid abuse during pregnancy, eight (8) of the articles involved focused on alcohol abuse during pregnancy, and four (4) articles involved focused on marijuana use during pregnancy.

The most effective interventions for mothers and their neonates affected by opioid abuse included treatment of addiction (Andrews et al., 2018; Howard et al., 2017; Krans et al., 2018;

Lander et al., 2015), prevention of relapse (Andrews et al., 2018; Krands et al., 2018; Lander et al., 2015), maintaining healthy mother-child relationships (Andrews et al., 2018; Krans et al., 2018; Howard et al., 2017), and patient education (Andrews et al., 2018; Howard et al., 2017). Other individual intervention that was found to be beneficial for neonates was 100% parental presence at bedside due to the increased frequency of breastfeeding and mother-child bonding that decreased the mean NAS score (Howard et al. 2017). Regarding alcohol use during pregnancy, motivational interviewing proved to be a significant intervention (Osterman et al., 2014; Rendall-Mkosi et al., 2012). Motivational interviewing was also used in the one article found on non-pharmacological interventions regarding marijuana use during pregnancy (Gray et al., 2017). This type of non-pharmacological intervention proved to be effective in clinical practice.

### **Recommendations**

This systematic review looked at 20 different studies generating a wide array of results regarding drug abuse during pregnancy. After review, the researchers formulated recommendations for future clinical use. Overall, more research regarding maternal use of illicit substances during pregnancy needs done and non-pharmacological interventions involving. Specifically, more research is needed in the area of marijuana use during pregnancy as only three relevant studies were found. This is important to future research and public health due to the legalization of marijuana in some U.S. states.

Based on current research done that is supported by this systematic review, Motivational Interviewing (Osterman, Carle, Ammerman, & Gates, 2014; Rendall-Mkosi, Morojele, London, Moodley, Singh, & Girdler-Brown, 2012) seemed to be the most effective intervention when aiding pregnant women addicted to marijuana or alcohol during pregnancy. This intervention

proved to be the most researched and most effective for these addictions. Since this intervention proved to be the most research, recommendations for different interventions are encouraged.

As for non-pharmacological interventions involved specialized comprehensive care that included treatment of addiction (Andrews et al., 2018; Howard et al., 2017; Krans et al., 2018; Lander et al., 2015), prevention of relapse (Andrews et al., 2018; Krands et al., 2018; Lander et al., 2015), patient education (Andrews et al., 2018; Howard et al., 2017), and maintaining healthy mother-child relationships (Andrews et al., 2018; Krans et al., 2018; Howard et al., 2017). This is best accomplished through coordinated, multidisciplinary care (Andrews et al., 2018). Providing this type of care is a complex and lengthy process to maximums efficiency in treating mothers and their neonates. Because of the complexity, the more research done on honing the process of providing comprehensive care for mother's with opioid abuse disorder and their neonates, the better.

Other recommendations for future clinical use is to provide more resources and non-pharmacological interventions for women addicted to marijuana, opioids, and alcohol. Researchers found it difficult to find relevant intervention studies regarding only non-pharmacological interventions. Pharmacological interventions came in abundance even when looking for non-pharmacological interventions. Clinical practices should be evaluating non-pharmacological interventions as well to assist women in their addiction.

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## Appendix

Systematic Review Table of Evidence

APA formatted reference	Purpose statement. Research question.	Clinical Practice Setting, Sampling methods, Sample size.	Design. Level of Evidence.	Findings, Conclusion	Practice & Research Implications	Limitations of Findings
Andrews, N. C., Motz, M., Pepler, D. J., Jeong, J. J., & Khoury, J. (2018). Engaging mothers with substance use issues and their children in early intervention: Understanding use of service and outcomes. <i>Child Abuse &amp; Neglect</i> , 83, 10-20. doi:10.1016/j.chabu.2018.06.011	<p>Purpose statement:” to 1) describe women’s use of service, 2) examine how early engagement of pregnant women related to postnatal service use, and 3) examine the circumstances in which women ended their service relationship with Breaking the Cycle” (p. 1).</p> <p>Research question: How does Breaking the Cycle help the gap between the relationship of mother and child that is lacking, “by providing not</p>	<p>Setting: Toronto, Canada</p> <p>Sampling methods: All mothers were asked during the intake process at BTC.</p> <p>Sample size: Out of 168 women who consented to participate, 160 were enrolled.</p>	<p>Design: quasi experimental</p> <p>Level of evidence: Level III</p>	<p>Findings: “...time in service is generally associated with better outcomes and highlights the success of long-term engagement in integrated, relationships-focused service for mothers with substance use issues and their children” (p. 10).</p> <p>Conclusion: “...participating in service at BTC relates to increased relationship capacity and improved mental health functioning” (p. 10).</p>	<p>Practice and Research Implication: “...consider the implications of a relational approach to health service provision, and the additional resources and supports that may be necessary to enable service providers to implement these essential services” (p. 10).</p>	<p>Limitations: Available information varied across participants, due to different use of service and length of involvement</p>

	only instrumental and substance use support for mothers with substance use issues, but also focus on strengthening and promoting the mother child relationship?" (p. 2).					
Angelotta, C., Weiss, C. J., Angelotta, J. W., & Friedman, R. A. (2016). A Moral or Medical Problem? The Relationship between Legal Penalties and Treatment Practices for Opioid Use Disorders in Pregnant Women. <i>Women's Health Issues</i> , 26(6), 595-601. doi:10.1016/j.whi.2016.09.002	Purpose statement: To describe the "...relationship between use of medication-assisted treatment (MAT) in pregnant women with opioid use disorders, the standard of care, and state laws that permit child abuse charges for illicit drug use during pregnancy" (p.1).	Setting: USA 2012 Sampling method: "Using publicly available data on substance abuse treatment in the United States, we describe patterns in the use of MAT for pregnant women with opioid use disorders in states with prenatal child abuse laws compared with states without such laws" (p.1) Sample Size: "In 2012, there were 8,292 treatment episodes of pregnant women with a primary opioid use disorder in the United	Design: Meta-analysis Level of Evidence: Level VI	Findings: "In 2012, there were 8,292 treatment episodes of pregnant women with a primary opioid use disorder in the United States for which data on MAT use were available. Among states with laws that permit child abuse charges for illicit drug use in pregnancy (18 states), MAT was used in 33.15% of treatment admissions compared with 51.33% of admissions in states without a law" (p.1).	practice & Research Implications: "Limitations of the study include the low number of participants who actually completed the study (only half of those consented), therefore limiting our ability to determine statistical significance among our primary dependent variables of retention and relapse rates. In addition, the explicit content of the OBGYN-affiliated providers' group discussion was not structured, nor were satisfaction ratings administered specific to these group sessions. Perhaps if this portion of the intervention were more prescribed it would have added to the efficacy of the intervention, and the impact could have been more	Limitations of Findings: Women may be reluctant to admit to opioid use because of the legal implications.

		States for which data on MAT use were available in TEDS-A. The majority of the treatment episodes were of women who were age 18 to 29 (71.93%; n ¼ 5,965), White (85.01%; n ¼ 7,049), and not married (72.26%; n ¼ 5,992)” (p. 4)			explicitly measured and replicated” (p .6).	
Bakhireva, L.N., Shrestha, S., Garrison, L., Leeman, L., Rayburn, W.F., & Stephen, J.M. (2018). Prevalence of alcohol use in pregnant women with substance use disorder. <i>Drug and Alcohol Dependence</i> .	<p>Purpose Statement: “This study evaluated self-reported prevalence of alcohol use in patients participating in a comprehensive prenatal care program for women with substance use disorder” (p. 1).</p> <p>Research Question: Is there a prevalence of alcohol use in pregnant women with substance use disorder?</p>	<p>Setting: Prenatal care program for women with substance use disorder, and pregnant women at general clinics at the University of New Mexico before conception periods and between the last menstrual period and pregnancy recognition.</p> <p>Sampling method: Conducted in six prenatal care clinics associated with the UNM departments of</p>	<p>Design: evaluated self-reported of alcohol usage. This study evaluated self-reported prevalence of alcohol use in patients participating in a comprehensive prenatal care program for women with substance use disorder (SUD; n = 295), of which 95% are treated for OUD, and pregnant</p>	<p>Findings: Alcohol consumption was higher in patients screened at the specialty clinic for pregnant women with SUD. 15% of pregnant women in general obstetrics and SUD patients consume at least 3 drinks/week on average.</p> <p>Conclusions: This study demonstrates a high prevalence of prenatal alcohol use in early pregnancy in both groups, while patients with SUD/ODU consume more alcohol. These findings underscore the need for targeted screening and intervention for alcohol use in all pregnant women,</p>	<p>Findings &amp; Research implications: To minimize participation bias, all pregnant women attending a scheduled prenatal visit on days when a study coordinator was present at the clinic were offered screening for the study. First study using a large U.S. sample of pregnant women to characterize periconceptional and early pregnancy alcohol use behaviors among women in a comprehensive treatment program for SUD (Mostly SUD)</p>	<p>Limitation of Findings: Prevalence might be an underestimation; information was obtained from the screening stage of the ENRICH study. They can’t report changes in alcohol usage later in pregnancy. , cannot report the exact number of subjects with OUD among MILARGO points who participated in the screening since questions about illicit drug use were not asked at the screening stage due to sensitivity, the general obstetric group was recruited mostly from low risk clinics. .</p>

		<p>OB/GYN or Family Medicine.</p> <p>Sampling Size: Large number of Hispanic/Latino participants. 97 (26.6%) from general obstetrics group and 74 (25.1%) patients with SUD were classified as binge/chronic moderate alcohol users.</p>	<p>women being served through general obstetrical clinics at the University of New Mexico (n = 365). During the screening phase of a prospective study, patients were asked to report alcohol use in the periconceptional period, and between the last menstrual period and pregnancy recognition. Results: The screening interview was conducted at 22.3 (median = 22; Q1 = 16; Q3 = 29) gestational weeks. Among patients screened at the SUD clinic, 28.8% and 24.1% reported at least one</p>	<p>especially those with SUD/OD</p>		
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			<p>binge drinking episode in the periconceptional period and in early pregnancy, respectively. The prevalence of binge drinking was similar in the general obstetrics population (24.7% and 24.4%, respectively). Among those who reported drinking in early pregnancy, median number of binge drinking episodes was higher among patients screened at the SUD clinic (median = 3; Q1 = 1; Q3 = 10) compared to the general obstetrics group (median = 1;</p>			
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			Q1 = 1; Q3 = 3; p < 0.001)			
			Level of Evidence: IV			
Coleman-Cowger, V. H., Oga, E. A., Peters, E. N., & Mark, K. (2018). birth outcomes of co-use of Cannabis and tobacco cigarettes during pregnancy. <i>Neurotoxicology and Teratology</i> , 68, 84-90. doi:10.1016/j.ntt.2018.06.001	Purpose Statement: "The purpose of this study is to: 1) describe the prevalence of co-use of Cannabis and tobacco cigarettes reported by a convenience sample of pregnant women presenting to two urban prenatal clinics; 2) outline correlates of co-use of Cannabis and tobacco cigarettes; and 3) compare birth outcomes between pregnant women who co-use Cannabis and tobacco cigarettes, who currently smoke tobacco cigarettes but do not use Cannabis, who currently use	Setting: Two University obstetric clinics in Maryland from January to December 2017. Sampling Method: "Pregnant women were enrolled in the study if they met the following criteria: 1) currently pregnant; 2) age 18 years or older; 3) able to speak and understand English sufficiently to provide informed consent; and 4) natural hair length at least 3cm to allow for drug testing" (p. 2). Sample Size: 1170 pregnant women were questioned in regard to this study at both clinics, 719 were eligible, and 500 were included.	Design: Quasi-experimental  Level of Evidence: Level III	Findings: "The prevalence rate of Cannabis and tobacco cigarette co-use as well as the prevalence rate of Cannabis only use is higher than the prevalence of tobacco cigarette only use, which is notable given the focus on tobacco cessation in clinical practice" (p. 5). Second, an association was found between co-use and smaller head circumference, but there was no correlation between Cannabis use and low birth weight.  Conclusion: "The examination of Cannabis and tobacco co-use during pregnancy among marginalized, vulnerable populations with relatively high use prevalence is a highly significant endeavor, particularly as Cannabis use, its potency, and availability in the US have increased in recent years. Additional research is needed to better understand	Practice & Research Implications: Recommended that a screening tool be created for pregnant women who use Cannabis, a greater focus on health implications is needed.	Limitations of Findings: No randomized group assignment (subjects were already pregnant and not for the sake of the study); more correlation and not prove causation



	<p>Cannabis but do not smoke tobacco cigarettes, and who do not currently use Cannabis or tobacco cigarettes” (p. 2).</p> <p>Research question: How do tobacco and Cannabis interact synergistically to influence birth outcomes?</p>			<p>how factors such as potency, reasons for use, modes of use, trimester of exposure, and contextual/environmental cues may moderate the relationship between co-use and health outcomes for both mother and child” (p. 6).</p>		
<p>Dotters-Katz, S.K., Smid, M.C., Manuck, T.A., &amp; Metz, T.D. (2017). Risk of neonatal and childhood morbidity among preterm infants exposed to marijuana. <i>Journal of Maternal Fetal Neonatal Medicine</i>. 30(24).</p>	<p>Purpose Statement: “We hypothesized that MJ-exposed preterm infants would have worse neonatal and childhood developmental outcomes compared to MJ-unexposed infants.” (p. 1.)</p> <p>Research Question: What is the risk of neonatal and childhood</p>	<p>Setting: 20 institutions around the United States from 1997-2004</p> <p>Sampling Method: Criteria: gestational age at 35 weeks was selected. Excluded twin gestations, infants with major congenital anomalies, and those infants who delivered after 34 weeks and 6 days of gestation.</p>	<p>Design: Secondary analysis of a multicenter randomized controlled trial</p> <p>Level of Evidence: I</p>	<p>Findings: 135 (7.2%) were marijuana exposed. No differences in neonatal or childhood outcomes in marijuana exposed infants compared to marijuana unexposed infants.</p> <p>Conclusion: Among infants born less weeks of gestation marijuana exposure was not associated with adverse neonatal or childhood outcomes. Long term follow up studies are needed to assess later childhood neurodevelopmental outcomes following marijuana exposure.</p>	<p>Practice and Research Implications: Data was from a large prospective randomized controlled trial. Childhood neurodevelopmental outcomes were collected by trained pediatricians or pediatric neurologists. Data from this study was collected at 20 centers across the United States and represent an ethnic makeup similar to the general population; makes the findings more generalizable.</p>	<p>Limitations: Inability to assess the frequency or timing of marijuana use during pregnancy. No human data regarding the fetal effects of marijuana based on trimester of exposure. They did not have urine drug screen results on all women; use may be underreported. Majority of babies in these studies were delivered following PPROM, an obstetric complication traditionally associated with high rates of</p>

	morbidity among preterm infants exposed to marijuana?	Sample Size: n=1867 infants				neonatal and childhood morbidity and mortality due to an increased likelihood of infectious morbidity.
Gray, J., Beatty, J. R., Svikis, D. S., Puder, K. S., Resnicow, K., Konkel, J., ... Ondersma, S. J. (2017). Electronic Brief Intervention and Text Messaging for Marijuana Use During Pregnancy: Initial Acceptability of Patients and Providers. <i>JMIR Mhealth And Uhealth</i> , 5(11), e172. <a href="https://doi.org/10.2196/mhealth.7927">https://doi.org/10.2196/mhealth.7927</a>	<p><b>Purpose Statement:</b> “The objective of the study was to evaluate, among pregnant women and prenatal care providers, the acceptability of an electronic brief intervention and text messaging plan for marijuana use in pregnancy” (p.1).</p> <p>Research question: “How acceptable is electronic brief intervention and text messaging plan for marijuana use in pregnancy to pregnant women and prenatal care providers?”</p>	<p><b>Setting:</b> a prenatal clinic in Detroit, Michigan</p> <p><b>Sampling Method:</b> Patient participants women recruited from a prenatal clinic in Detroit, Michigan. Inclusion criteria were self-report of marijuana use at least twice weekly in the month before pregnancy, aged between 18 and 40 years, less than 20 weeks pregnant, and owning a cellphone (As participants would be responsible for any charges resulting from receiving text messages on their personal phone, all participants were specifically asked their willingness to receive text</p>	<p><b>Design:</b> “Participants included patients (n=10) and medical staff (n=12) from an urban prenatal clinic. Patient-participants were recruited directly during a prenatal care visit. Those who were eligible reviewed the interventions individually and provided quantitative and qualitative feedback regarding software acceptability and helpfulness during a one-on-one interview with research staff. Provider-</p>	<p>“Patient-participants provided high ratings for satisfaction, with mean ratings for respectfulness, interest, ease of use, and helpfulness ranging between 4.4 and 4.7 on a 5-point Likert scale. Of the 10 participants, 5 reported that they preferred working with the program versus their doctor, and 9 of 10 said the intervention made them more likely to reduce their marijuana use. Provider-participants received the program favorably, stating the information presented was both relevant and important for their patient population.”</p>	<p>“These findings suggest that the women in this study were open to examining their marijuana use during pregnancy and to doing so via technology. Participants were happy with the unbiased presentation of the effects of marijuana on the baby, found the materials useful and easy to use, and clearly spent time evaluating whether or not they should stop use during pregnancy.”</p>	<p>This study is limited by its relatively small sample size of all African American women from a clinic in the urban Detroit area. However, Their aim was not to conduct a fully powered test of an a priori hypothesis, but rather to provide information regarding participant acceptability and usability, which typically involves smaller sample sizes. Additionally, it may have been preferable to present text messages for feedback as a presentation where each text message could be looked at separately. Having a single document with a sample of each week's messages was overwhelming for some participants. Future studies should also consider ways to tailor the text messages for the participants</p>

		<p>messages during a feedback interview.).</p> <p>Exclusion criteria included inability to understand English, inability to provide consent, consideration of an elective abortion or adoption for the current pregnancy, or past participation in any other study by the authors.</p> <p>Provider-Participants of the medical staff from the same prenatal clinic, members volunteered to participate in focus groups regarding the intervention materials. We offered participation to all physicians in the department; physicians were available to attend one focus group, and medical staff (all of the nurses, medical assistants, and reception staff</p>	<p>participants took part in focus groups in which the intervention materials were reviewed and discussed.</p> <p>Qualitative and focus group feedback was transcribed, coded manually, and classified by category and theme.”</p>			<p>providing feedback. This study was only able to show examples and describe how messages would be tailored and may have missed valuable feedback because of the presentation format.”</p>
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		from the clinic where recruitment took place) participated in the second focus group.				
Howard, M. B., Schiff, D. M., Penwill, N., Si, W., Rai, A., Wolfgang, T., Wachman, E. M. (2017). Impact of Parental Presence at Infants' Bedside on Neonatal Abstinence Syndrome. <i>Hospital Pediatrics</i> . doi:10.1542/hpeds.2016-0147	Purpose statement: "to examine the effect of the amount of parental presence at the bedside on NAS severity; specifically, the association with 3 main outcomes: (1) hospital LOS, (2) extent of pharmacologic therapy required, and (3) mean Finnegan withdrawal scores" (p. 2). Research question: "examine the association between rates of parental presence and NAS outcomes" (p. 2).	Setting: Infants born at Boston Medical Center between March 2015-April 2016 with opioid exposure prior to birth. Sampling methods: Subjects were considered eligible to participate in the study if: "maternal opioid agonist treatment with methadone or buprenorphine during the third trimester of pregnancy and infants with a gestational age >36 weeks treated with opioid replacement therapy for opioid withdrawal on a pediatric inpatient unit" (p. 2).	Design: quasi experimental; "retrospective, single-center cohort study of infants treated pharmacologically for NAS using a rooming-in model of care" (p. 1).  Level of Evidence: Level III	Findings: Breastfeeding was associated with decreased LOS. However, infants who were breastfed had a higher percentage of parental presence. "Across the cohort, the mean NAS score when a parent was present was significantly lower compared with when a parent was not present" (p. 4).  Conclusion: Study supports the role of rooming-in and parental engagement in infant care for decreasing withdrawal severity, LOS, and pharmacological treatment of infants with NAS" (p. 6). Breastfeeding should be encouraged in order to decrease LOS and increase parental involvement.	Practice and Research Implications: Focus on parental presence to promote breastfeeding, skin-to-skin time, and parental-infant bonding. Additional research is needed to explore support programs to help eliminate the barriers to parental presence; specifically, "...the stigma and guilt experienced by women with substance use disorders watching their infants go through withdrawal" (p. 5).	Limitations: small sample size, how they measured parental presence (new metric for nurses to chart)

		Sample size: Out of 138 infants with in-utero exposure, only 86 were selected to be included in the study cohort.				
Kaner, E., Bland, M., Cassidy, P., Coulton, S., Dale, V., Deuca, P., Gilvarry, E., Godfrey, C., Heather, N., Myles, J., Newbury-Birch, D., Oyefeso, A., Parrott, S., Perryman, K., Phillips, T., Shepherd, J. & Drummond, C. (2013) Effectiveness of screening and brief alcohol intervention in primary care (SIPS trial): pragmatic cluster randomized controlled trial. <i>BMJ</i> 346, 8501. doi: <a href="https://doi.org/10.1136/bmj.e8501">https://doi.org/10.1136/bmj.e8501</a>	Purpose Statement & Research Question Research Question: What is the effectiveness of screening and brief alcohol intervention in pregnant women? Purpose Statement: To evaluate the effectiveness of different brief intervention strategies at reducing hazardous or harmful drinking in primary care.	Setting: Primary care practices in the north east and southeast of England and in London Sampling Methods: 3562 patients aged 18 or more routinely presenting in primary care of whom 2991 (84%) were eligible to enter the trial: 900 (30.1%) screened positive for hazardous or harmful drinking and 756 (84%) received a brief intervention. The sample was predominantly male (62%) and white (92%) and 34% were current smokers. Sample Size: 3562	Design: Practices were randomized to three interventions, each of which built on the previous one: a patient information leaflet control group, five minutes of structured brief advice, and 20 minutes of brief lifestyle counselling. Delivery of the patient leaflet and brief advice occurred directly after screening and brief lifestyle counselling in a subsequent consultation. Pragmatic cluster	Findings: Patient follow-up rates were 83% at six months (n=644) and 79% at 12 months (n=617). At both time points an intention to treat analysis found no significant differences in AUDIT negative status between the three interventions. Compared with the patient information leaflet group, the odds ratio of having a negative AUDIT result for brief advice was 0.85 (95% confidence interval 0.52 to 1.39) and for brief lifestyle counselling was 0.78 (0.48 to 1.25). A per protocol analysis confirmed these findings Conclusions: All patients received simple feedback on their screening outcome. Beyond this input, however, evidence that brief advice or brief lifestyle counselling provided important additional benefit in reducing hazardous or	Practice and Research Implications: This research provided good information for future research. It would be beneficial to look into the specific aspects of brief intervention to see which part makes an impact. Research into how women receive brief interventions would allow insight into why it is effective.	Limitation of Findings: Inability to initiate more intense brief intervention. Lack of previous research to build off.

		patients	randomized controlled trial Level of Evidence: Level III	harmful drinking compared with the patient information leaflet was lacking.		
Krans, E.E., Bobby, S., England, M., Gedekoh, R.H., Chang, J.C., Maguire, B.,...English, D.H. (2018). The pregnancy recovery center: A women-centered treatment program from pregnant and postpartum women with opioid use disorder. <i>Addictive Behaviors</i>	<p>Purpose statement: “is to a) evaluate the impact of women-centered services on outcomes among pregnant and postpartum women with OUD and b) provide a programmatic description of women-centered services that can be used to inform the clinical protocols of treatment programs that care for women with OUD” (p. 2).</p> <p>Research question: Does a women-centered treatment program for pregnant and postpartum women with</p>	<p>Setting: Magee-Women’s Hospital between July 2014 and 2016</p> <p>Sampling methods: Among 643 women who gave birth at this hospital, 248 were using buprenorphine. 71 enrolled in PRC and 177 were enrolled in a non-PRC buprenorphine treatment program</p> <p>Sample size: 248 pregnant women with OUD</p>	<p>Design: comparison of two retrospective cohorts</p> <p>Level of Evidence: Level IV</p>	<p>Findings: Pregnancy Recovery Center patients “had significant improvement in pregnancy-specific MAT dosing, postpartum visit attendance, breastfeeding continuation rates and postpartum LARC use” (p. 5).</p> <p>Conclusion: “Incorporating women-centered services into OUD treatment programming may improve gender-specific outcomes among women with OUD” (p. 1).</p>	Practice and Research Implications: Further research is needed to address the unique needs of pregnant and postpartum women to improve the health of women with OUD and their children	Limitations: difficult to make claims of cause and effect, were self-selected into each group; patients were predominantly Caucasian

	opioid use disorder improve outcomes for mother and child?					
Lander, L. R., Gurka, K. K., Marshalek, P. J., Riffon, M., & Sullivan, C. R. (2015). A Comparison of Pregnancy-Only versus Mixed-Gender Group Therapy among Pregnant Women with Opioid Use Disorder. <i>Social Work Research</i> , 39(4), 235-244. doi:10.1093/swr/svv029	<p>Purpose statement: “This study aimed to determine whether treating pregnant women in pregnancy-only therapy groups improved outcomes compared with treatment in mixed-gender therapy groups” (p. 1)</p> <p>Research question: Do pregnant women in pregnancy-only therapy groups show more improvement than pregnant women in mixed-gender therapy groups?</p>	<p>Setting: Comprehensive Opioid Addiction Therapy (COAT) outpatient clinic in West Virginia</p> <p>Sampling Method: “inclusion criteria included pregnancy with opioid use disorders and seeking medication-assisted treatment with buprenorphine. To meet eligibility, participants were required to obtain prenatal care and sign a release of information for study staff to abstract pregnancy and birth-related data from their medical record. Participants also were required to sign the COAT clinic treatment</p>	Design: Randomized control trial Level of evidence: Level II	<p>Findings: “The difference in these retention rates between the two groups was not significant” (p.5)</p> <p>Conclusion: “Our initial hypothesis was that a pregnancy-only group would be superior to TAU in terms of retention in treatment, lower rates of relapse, patient satisfaction, and quality-of-life measurements. Our findings suggest that the two groups were very similar on all measures. From this study, it appears that one of the most important factors in managing pregnant patients with opioid use disorders is to reduce barriers to treatment and treat opioid dependence itself.” (p.8)</p>	Practice and Research Implications: “Limitations of the study include the low number of participants who actually completed the study (only half of those consented), therefore limiting our ability to determine statistical significance among our primary dependent variables of retention and relapse rates. In addition, the explicit content of the OBGYN-affiliated providers’ group discussion was not structured, nor were satisfaction ratings administered specific to these group sessions. Perhaps if this portion of the intervention were more prescribed it would have added to the efficacy of the intervention, and the impact could have been more explicitly measured and replicated.”(p.8)	Limitations: Small sample size of only 45.

		agreement guidelines” (p.3) Sample size: 45 pregnant women				
Lowe, J., Qeadan, F., Leeman, L., Shrestha, S., Stephen, J. M., & Bakhireva, L. N. (2017). The effect of prenatal substance use and maternal contingent responsiveness on infant affect. <i>Early Human Development</i> , 115, 51–59. <a href="https://doi.org/10.1016/j.earlhumdev.2017.09.013">https://doi.org/10.1016/j.earlhumdev.2017.09.013</a>	.Purpose Statement: The specific aims of this prospective cohort study were to examine: 1) the differences in maternal behavior styles during the SFP between women who used alcohol, opioids, both substances in combination, or abstained from alcohol and illicit drugs during pregnancy; 2) the contributing effects of prenatal substance use and parenting style (operationalized as maternal contingent responding) on infant positive affect during maternal-infant play episodes of the SFP. We hypothesized that	Setting: two consecutive prospective cohort studies conducted at the University of New Mexico (UNM) with the same study population Sample methods: “A prospective cohort design was utilized with repeated assessment of substance use during pregnancy and the administration of the SFP, which measures infant response to a social stressor, at approximately 6 months of age. Subjects included 91 dyads classified into four groups: 1) Control (n = 34); 2) Medication assisted therapy for opioid dependence	Design: Data were derived from two consecutive prospective cohort studies conducted at the University of New Mexico (UNM) with the same study population. The UNM Human Research Review Committee approved both studies and patients gave written informed consent. The Biomarkers, Infant Neurodevelopment, and Growth (BINGO) study was conducted at UNM in 2011–2012 and served as a pilot	Findings: “The results of this study support and expand our previous findings in a different population [47], that a supportive parenting style, which includes acknowledgement of infant affect (such as when they were happy or sad) and uses playful games to re-engage the infant (such as peek-a-boo) explained more variability in infant emotional regulation than prenatal exposure to alcohol and/or opioids. With respect to exposure to substances of abuse, there were no significant effects of prenatal substance exposure on infant affect, although there was a trend ( $p = 0.053$ ) for a lower infant affect in the Alcohol group compared to Controls in the last reunion/play episode, when the child is more likely to accumulate “carry-over effect” from prior SFP episodes. The lack of influence of prenatal	Practice and Research Implications: “Future directions may include developing strategies for teaching parents who have infants prenatally exposed to alcohol and other substances how to respond in a sensitive manner that is responsive to their infant's emotion. Parents can be taught that certain behaviors, such as attention seeking, can be less pleasing or possibly annoying to their infant, while simple games, such as ‘peek-a-boo,’ can be fun and engaging. This could potentially help improve infants' positivity, which is relevant as children prenatally exposed to alcohol have been found to have problems with ‘negative affectivity’ and irritability . Future work should also explore mediation analysis in the context of the SFP, focusing on the complexity of controlling for postnatal environment and maternal interaction as mediators.	Limitations of Findings: “The SFP has been used extensively in the literature, but is only a proxy for a stressful situation; one can only infer that the measure of affect indicates the infant was upset and therefore stressed. Early in life there are many situations that cause an infant to become upset, and the ability to self-calm or be soothed by a parent can be indicative of the infant's ability to regulate their emotions. We acknowledge that the limited effect of prenatal exposure on infant affect could be due to the following reasons: 1) small sample size in the Alcohol group, which potentially resulted in the results being of borderline statistical significance; 2) light-to-moderate levels of alcohol consumption in this



<p>substance using women will be less likely to engage in contingent responding behavior style, and that maternal contingent responding would be an equally important predictor of infant affect as prenatal exposure to substances of abuse.” (p. 2)</p> <p>Research Question: How does the maternal contingent responding of substance using women effect infant affect as prenatal exposure to substances of abuse?</p>	<p>(MAT; n = 19); 3) Alcohol (n = 15); 4) Alcohol + MAT (n = 23). Mean % of positive infant affect and mean % of maternal responsiveness (watching, attention seeking, and contingent responding) was compared among the five SFP episodes across the four study groups by MANOVA. Mixed effects modelling was used to estimate the contributing effect” (p. 1). Sample size: 91 maternal-infant pair</p>	<p>study to the larger, ongoing Ethanol, Neurodevelopment, Infant and Child Health (ENRICH) cohort study, which began in 2013. Participants were recruited from UNM-affiliated prenatal care clinics. Both studies included three visits: 1) prenatal, during one of the first prenatal care appointments; 2) early postpartum, during the hospital stay after labor and delivery; and 3) neurodevelopmental and SFP assessment of children at ~6 months of age. The following eligibility criteria were applied to all</p>	<p>substance exposures is further supported by the result indicating that the model containing maternal contingent responding accounted for 67% of the variance, in contrast to 16% for the model testing the group effect.” (p. 7). Conclusions: “In conclusion, we found that infants of mothers who used contingent responsiveness demonstrated more positive affect during play episodes of the SFP. Additionally, infants displayed less positivity when their mothers used attention seeking behaviors. Maternal behavior did not vary among the exposed and unexposed subjects; however, maternal behavior had a much greater influence on infant affect compared to prenatal exposures. Our findings are relevant to infants exposed to drugs and alcohol, as they are often described as dysregulated, easily overstimulated, and irritable. These results are important because they suggest that modifiable postnatal factors play a role</p>	<p>Future studies should examine the effects of the timing of exposure and different patterns of substance use on infant stress reactivity. Finally, longitudinal studies should also explore if the improvement of infant-mother interactions lead to decreased behavioral problems and/or improved social functioning across childhood in this vulnerable population.” (p. 8)</p>	<p>sample, especially beyond the periconceptional period; 3) prenatal substance exposure being a more distant measure as compared to maternal behavior which is measured in the same dyadic context during the SFP. Furthermore, assessing infant affect and maternal interaction style within the same paradigm limits the generalizability of the results; future studies would benefit from evaluating the effect of parental style earlier in life on more distant infant behavioral outcomes. Though there were demographic differences between the groups, these were controlled for in the multivariable analyses. Co-exposures with other substances, especially tobacco and marijuana, were prevalent among the three exposed groups; however, since Controls had no co-exposure to these substances by definition,</p>
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			<p>participants: 1) at least 18 years old; 2) singleton pregnancy; 3) currently residing and planning to stay in the Albuquerque metropolitan area to complete all study visits; 4) ability to give informed consent in English; and 5) no fetal diagnosis of a major structural anomaly. Pregnant women in both cohort studies were recruited into one of four mutually exclusive study groups, as follows:</p> <p>participants 1) without perinatal substance exposures (Control); 2)</p>	<p>in infant positivity, which may help mediate effects of prenatal substance exposures” (p. 8).</p>		<p>we could not adjust for them in multivariable analyses. Finally while we controlled for the key socio-demographic (marital status, maternal education, family income), medical (depressive symptoms), and infant (age at assessment, sex) factors, we recognize that there are multiple other pre- and postnatal factors which can affect infant stress reactivity and maternal behavior.”(pg 7, paragraph 6)</p>
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			with opioid use disorder who prenatally received medication assisted therapy (MAT; either methadone or buprenorphine) and did not use alcohol in pregnancy; 3) with alcohol use during pregnancy (Alcohol); and 4) with MAT and alcohol use during pregnancy (Alcohol + MAT). While the focus of both cohorts was to ascertain the effects of prenatal alcohol exposure on infant outcomes, MAT and Alcohol + MAT groups were included, in addition to unexposed controls, to			
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			<p>better match pre- and post-natal environmental factors across groups. Participants classified into the control group needed to 1) be a lifetime abstainer of illicit drugs and tobacco products (reported use of <math>\leq 100</math> cigarettes in lifetime); and 2) abstain from alcohol use since the last menstrual period (LMP) and be no more than a light alcohol user (<math>\leq 2</math> standard drinks/week on average) before the LMP. Participants classified into the alcohol-exposed groups (Alcohol, Alcohol + MAT) had to 1)</p>			
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			self-report at least moderate levels of drinking [37] in the periconceptional period ( $\geq 3$ drinks per week or $\geq 2$ binge drinking episodes [‘binge’ defined as $\geq 4$ drinks per occasion] during the month surrounding the LMP) using the Timeline Follow-Back assessment method; and 2) continue drinking during pregnancy, as confirmed by self-report or positive ethanol biomarker. The self-reported cutoffs for risky alcohol use employed in this study and our conjunctive use of ethanol biomarkers in			
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			pregnancy are rigorous and well-supported by the literature [37–41]. The final sample size for this analysis was 91 maternal-infant pairs who had completed the three study visits as of January 2017.” (p. 2) Level of Evidence: Level 4			
M., Walbeek, C.V., & Vellios, N. (2017). The prevalence of fetal alcohol syndrome and its impact on a child’s classroom performance: A case study of rural south african school. <i>International Journal of Environmental Research and Public Health</i> . 14, 1-10. doi:	Statement: The study aims to reveal the prevalence of FAS in a rural South African school to observe the effects of FAS on students’ abilities, interactions and education	Setting: A farm school in rural South Africa near Clanwilliam in the South Western Cape Sampling Method: Students were chosen from the poorest district, or quantile in Clanwilliam. The students attending this school are more likely to be neglected physically and emotionally at	Design: Seven months were spent observing the language, mathematics, reading, and behavior abilities of the 166 students. The data was observed by the researcher and collected by the teachers. The researchers used the Behavioral Observation of	Findings: 21 students were diagnosed with FAS. In all four categories of learning children with FAS had lower performance than those without FAS. Conclusion: The prevalence of FAS is higher in farm regions than in towns and students with FAS perform worse in educational markers. The reason that there is not a higher difference in the performance of students with and without FAS could be because the majority of students come from homes	Research Implications: Students who have FAS should be placed in learning environments that are noise controlled, with less stimuli. Limitations of findings	Limitations: There is a small sample size. Only FAS not all FASD were diagnosed. There is a possibility of bias or error in the measurement of the educational outcomes.

10.3390/ijerph14080896.		<p>home.</p> <p>Consumption of alcohol in large quantities is not uncommon in this community.</p> <p>Alcohol is made at home illegally and sold. Workers receive pay checks on Fridays and sell alcohol at the farms where they work</p>	<p>Students in School (BOSS). TO collect data on behaviors, each student underwent two 15-minute BOSS sessions over six months. A medical doctor in the area provided data on the diagnosis of FAS on each student.</p> <p>Information was documented on the FAS assessment form</p> <p>Level of Evidence: V</p>	that are dysfunctional to some significant degree		
<p>Mark, K., Desai, A., &amp; Terplan, M. (2015). Marijuana use and pregnancy: Prevalence, associated characteristics, and birth outcomes. <i>Women's Mental Health</i></p>	<p>Purpose Statement: "This study examined the prevalence, behaviors, and birth outcomes associated with marijuana use in pregnancy" (pg 1)</p> <p>Research question: What does the</p>	<p>Sample size: 398 patients</p> <p>Setting: single urban university affiliated clinic from July 1 2009-June 30 2010</p> <p>Sample methods: intake data retrieved from the prenatal chart which included a</p>	<p>Design: a chart review of all patients presenting for prenatal care; retrospective cohort</p> <p>Level of evidence: Level III</p>	<p>Findings: intake 116 (29.3%) screened positive for marijuana either by self-report or urine toxicology. 116, 27 were positive by urine only, 35 by self-report only, 54 by both urine by both urine and self-report</p> <p>Conclusion: prevalence of marijuana that reported at 29.3% was higher than that reported in the national survey on drug use and</p>	<p>Research implications: Despite the high prevalence of marijuana use prenatal care, most women stopped using marijuana during pregnancy. Only three women had a positive toxicology screen at the time of delivery</p>	<p>Limitations to findings: retrospective cohort that relies partially on provider documentation of screening. May have had selection bias, not consistently screened with urine toxicology. Frequency of marijuana use was not elicited nor was detailed information about a quit date obtained.</p>

	prevalence of marijuana use during pregnancy?	complete social work eval.		health. Despite high prevalence, most of the women stopped using marijuana during pregnancy		
May, P.A., Chambers, C.D., Kalberg, W.O., Zellner, J., Feldman, H., Buckley, D., & Hoyme, H.E. (2018). Prevalence of fetal alcohol spectrum disorders in 4 US communities. <i>American Medical Association</i> . .doi:10.1001/jama.2017.21896	Purpose Statement: "To estimate the prevalence of fetal alcohol spectrum disorders, including fetal alcohol syndrome, partial fetal alcohol syndrome, and alcohol-related neurodevelopmental disorder in 4 regions of the United States Research question: How prevalent are fetal alcohol spectrum disorders in the United States?	Setting: Four Communities in the Rocky Mountain, Midwestern, South Eastern, and Pacific Southwestern regions of the United States  Sampling Method: First-grade children and their parents or guardians. A cross sectional design was used to assess children for fetal alcohol spectrum disorders between 2010-2016. Children were systematically assessed in the four domains that contribute to the fetal alcohol spectrum disorder: dysmorphic features, physical growth, neurobehavioral	Design: Active-case ascertainment with a cross-sectional design was used at 4 community sites, a convenience sample that was selected based on the investigators' ability to engage the individual communities and on the feasibility of conducting the study in that community  Level of Evidence: Level V or VI	Findings: Prevalence of fetal alcohol spectrum disorders in the 4 communities was the main outcome. Conservative estimates for the prevalence of the disorder and 95% CIs were calculated using the eligible first-grade population as the denominator. Weighted prevalence and 95% CIs were also estimated, accounting for the sampling schemes and using data restricted to children who received a full evaluation. 222 cases of fetal alcohol spectrum disorders were identified. The conservative prevalence estimates for fetal alcohol spectrum disorders ranged from 11.3 (95% CI, 7.8-15.8) to 50.0 (95% CI, 39.9-61.7) per 1000 children. The weighted prevalence estimates for fetal alcohol spectrum disorders ranged from 31.1 (95% CI, 16.1-54.0) to 98.5 (95% CI, 57.5-139.5) per 1000 children	Practice and Research Implications: Findings may represent more accurate US prevalence estimates than previous studies but may not be generalizable to all communities.	Limitation of Findings: due to local policy variations in the modes of access allowed for recruitment of children, as well as variability in willingness to consent, no individual sample evaluated the entire eligible population. Consent rates for screening ranged from 36.9%-92.5% in individual samples and overall consent rates for screening averaged only 59.9% of eligible children. If non consented children differed from consented, this could have biased prevalence estimates in either direction. Second: numbers of cases of each category of fetal alcohol spectrum disorder in each sample are small, leading to wide CIs. Third: neurobehavioral testing at this age may have missed some children with deficits that would no become



		development, and prenatal alcohol exposure  Sampling Size: 6639 Children from a population of 13,146 first graders (boys, 51.9%; mean age 6.7 years old and white maternal race, 79.3%		Conclusion: Estimated prevalence of fetal alcohol spectrum disorders among first graders in 4 US communities ranged from 1.1%-5.0% using a conservative approach. These findings may represent more accurate US prevalence estimates than previous studies but may not be generalizable to all communities		apparent until later ages, which could have led to underestimation of rates. Fourth: this cross-sectional study was neither a longitudinal nor a clinical sample. Fifth criteria defining neurobehavioral impairment in this study were selected to balance sensitivity for deficits that have functional consequences with specificity for the characteristic neurobehavioral domains known to be affected by prenatal alcohol exposure. Also, these four communities in the study might not be the greatest representation for the United States overall
Metz, V. E., Brown, Q. L., Martins, S. S., & Palamar, J. J. (2018). Characteristics of drug use among pregnant women in the United States: Opioid and non-opioid illegal drug use. Drug &	Purpose Statement: "...the aims of this study were to: 1) examine associations between sociodemographic characteristics, mental health characteristics, and substance use	Setting: "The study included data from women aged 18–44 years from the National Survey on Drug Use and Health (NSDUH), years 2005–2014. The NSDUH is an annual, cross-sectional, nationally	Design: "Data on pregnant women aged 18–44 reporting past-year, nonmedical opioid use or use of non-opioid illegal drugs (other than marijuana) were analyzed	Findings: "Most women were non-Hispanic White (67.6%), had a high school diploma or less education (61.0%), a household income < \$20,000/year (72.2%), and health insurance coverage (84.3%). No significant differences between the three groups were found regarding sociodemographic	Practice and Research Implications: "Despite comparable sociodemographic characteristics among pregnant drug-using women in the US, opioid and non-opioid-using groups differed regarding mental health status and substance use severity. This calls attention to the need for access to	Limitations of Findings: "We could not determine whether self-reported past-year drug use occurred only before pregnancy or whether these women were aware, they were pregnant when (continuing) using drugs. Furthermore, due to the study's cross-sectional

Alcohol Dependence, 183, 261–266. <a href="https://doi.org/10.1016/j.drugalcdep.2017.11.010">https://doi.org/10.1016/j.drugalcdep.2017.11.010</a>	profiles in order to identify correlates of nonmedical opioid use (i.e., nonmedical only-opioid versus opioid polydrug use) and non-opioid illegal drug use during pregnancy, and 2) estimate the prevalence of cigarettes, alcohol, and marijuana use by pregnancy trimester and examine whether use is correlated with nonmedical opioid and/or other illegal drug use.” (pg 2, paragraph 2) Research Question: How does sociodemographic, mental health, and drug use characteristics correlate with prevalence of nonmedical opioid and/or	representative survey that assesses substance use and other behaviors among a probability sample of non-institutionalized individuals living in households within the 50 US states and the District of Columbia ages 12 years and older (Substance Abuse and Mental Health Services Administration” (pg 2, paragraph 3) Sample methods: “Surveys were administered via computer-assisted interviewing, conducted by an interviewer, and audio computer-assisted self-interviewing. Interviewers were trained to not view the screens during survey administration to maintain the privacy and	from the National Survey on Drug Use and Health (2005–2014). Women (N = 818) were categorized into 3 groups: 1) use of opioids only (n = 281), 2) opioid polydrug users (n = 241), and 3) other (non-opioid) illegal drug users (n = 296). Characteristics between the 3 groups of women were compared using bivariable analysis.” (p.1) Level of Evidence: Level 6	characteristics. Past-30-day marijuana use was less prevalent among opioid-only users (10.9%) compared to opioid-polydrug users (43.6%) and other pregnant illegal drug users (27.6%) ( $P < 0.001$ ) and past-year drug/alcohol treatment was less prevalent among opioid-only users (6.3%) compared to opioid-polydrug users (20.3%) and other illegal drug users (8.3%) ( $P = 0.002$ ). Opioid-only users also reported lower prevalence of past-year depression ( $P < 0.001$ ) and anxiety ( $P = 0.039$ )” (pg 1, paragraph 3) Conclusions: “Pregnant drug-using women were often of low socioeconomic status, with mental health and substance use patterns suggesting the need for targeted mental health/substance use screening and interventions before and during pregnancy, particularly for opioid-polydrug use” (p. 1)	mental health and drug use screening for women of childbearing age with low socioeconomic status, as well as for more targeted prevention efforts aimed at educating women of the risk of prenatal substance use, and the need for non-stigmatizing treatment approaches for women who misuse opioids and other illegal drugs during all stages of pregnancy” (p.5).	design, causality cannot be inferred. In addition, there might be trends that could not be accounted for, such as that the proportion of non-opioid illegal drug using women decreased over time. Also, sensitivity analyses for past-month use could not be conducted due to too few women in many cells. This study only included non-institutionalized women, so individuals not included in the sample (e.g., homeless) may be underrepresented and results may be less generalizable to such populations” (p. 5).
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	another illegal drug use?	<p>confidentiality, and to increase the likelihood of honest reporting (Butler et al., 2011). All variables were self-reported. Sampling weights were provided by NSDUH to account for unit- and individual-level non-response and adjusted to ensure estimates were consistent with estimates provided by the US Census Bureau.</p> <p>Aggregated data from all cohorts of pregnant women aged 18–44 who reported past-year, nonmedical opioid use and/or other non-opioid illegal drug use (other than marijuana) were examined (N = 818). Analyses were restricted to this subset of women, which is consistent with previous literature</p>				
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		examining prenatal substance use among adults (Brown et al., 2017; Ko et al., 2015). The weighted interview response rates ranged from 71.2–76.0% annually” (p.2). Sample size: 818 pregnant women aged 18–44 years who reported past-year nonmedical opioid use and/or another non-opioid illegal drug use				
Nørgaard, M., Nielsson, M. S., & Heide-Jørgensen, U. (2015). Birth and Neonatal Outcomes following Opioid Use in Pregnancy: A Danish Population-Based Study. <i>Substance Abuse: Research and Treatment</i> , 9s2.	Purpose Statement: To examine “adverse birth outcomes in women exposed to methadone or buprenorphine during pregnancy and the risk of neonatal abstinence syndrome (NAS) among neonates exposed to buprenorphine, methadone,	Setting: Denmark 1997–2011 Sampling method: “We included all pregnant women who during the period 1997–2011 gave a live birth or a stillbirth after the 20th week of gestation. The women were identified through the Danish Medical Birth Registry, <sup>17</sup> which contains computerized	Design: “The women were identified through the Danish Medical Birth Registry, <sup>17</sup> which contains computerized records of all births in Denmark since January 1, 1973. Data were recorded by the midwives or the physicians	Findings: “we identified 557 pregnancies exposed to buprenorphine, methadone, and/or heroin (167 to buprenorphine, 197 to methadone, 28 to self-reported heroin, and 165 to combinations)” (p. 1) Conclusion: “maternal use of buprenorphine and methadone during pregnancy was associated with increased prevalence of adverse birth outcomes, and this increase could only be explained to a smaller	Practice and Research Implications: “We had no method of identifying women with an illicit use of opioids who were not undergoing treatment. It is thus likely that we have misclassified some of the exposed women as unexposed, which would bias our relative estimates toward the null” (p. 9).	Limitations: “A major weakness of our study is that the use of prescription data to identify the users of buprenorphine did not allow us to distinguish between prescriptions for analgesic purposes only and prescriptions to opioid-dependent women” (p. 10)

	and/or heroin <i>in utero</i> ” (p. 1).	records of all births in Denmark since January 1, 1973” (p.1) Sample size: “950,172 pregnancies in a total of 571,823 women” (p.1).	attending the deliveries. The registry includes information on maternal age, parity, multiplicity of gestation, birth weight, gestational age, self-reported maternal smoking status, and delivery. We obtained information on exposure by combining data from the Danish Register of Medicinal Product Statistics, and from the Registry of Drug Abusers Undergoing Treatment. <sup>19</sup> We linked all data using the 10-digit civil registration number (the CPR number) which is a unique	extent by increased prevalence of smoking. The risk of NAS was eight-fold higher in methadone-exposed neonates than that in buprenorphine-exposed neonates, but this difference may at least partly be explained by differences in underlying indications (analgesic versus opioid maintenance treatment) between the two groups” (p.1).		
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			identifier assigned, since 1968, to all Danish residents by the Central Office of Civil Registration and used in all Danish healthcare registries" (p.2)			
Osterman, R.L., Carle, A.C., Ammerman, R.T., & Gates, D. (2014). Single-session motivational intervention to decrease alcohol use during pregnancy. <i>Journal of Substance Abuse Treatment</i>	<p>Purpose Statement: the effectiveness of a single session of motivational interviewing (MI) to decrease alcohol use during pregnancy</p> <p>Research question: Is a single session of motivational interviewing intervention effectively decrease alcohol use during pregnancy?</p>	Setting: recruited pregnant women at three prenatal clinics located in a midwestern university medical center. Women attending an obstetrical clinic treating low-moderate risk pregnancies, a high-risk perinatal center, or a nurse practitioner/midwifery practice consented to participate in the study (N=184). To determine study eligibility, consenting women completed baseline demographic information and	<p>Design: randomized clinical trial.</p> <p>Level of Evidence: Level II</p>	<p>Findings: A single-session MI approach was not effective in decreasing alcohol use during pregnancy.</p> <p>Conclusion: "Theory-based influencers of behavior change should be considered to provide interventions with the greatest potential to decrease prenatal alcohol use in pregnant women less motivated and less ready for change" (p. 15).</p>	Practice and Research Implications: "Future studies can increase the number of sessions of the intervention to increase potency of the intervention" (p. 15).	Limitation of Findings: all women in the current study were attending prenatal care visits with no prescriptions to the standard care or education provided regarding the risks of prenatal alcohol use. Another is the inability to interpret the curvilinear relationships in drinking behaviors due to only three time points of data collected was a study limitation.

		<p>instruments measuring alcohol use for the previous 30 days and previous year. Pregnant women who were 36 weeks or less gestation, between the ages of 18 and 44 years inclusive, able to understand, speak, and read English, who reported any alcohol use in the previous year, and being available for telephone follow-ups at 30 days postbaseline and 30 days postpartum were eligible</p> <p>Sampling Method: Eligible pregnant women who drank any amount of alcohol in the previous year (n=122) were randomized to an intervention or comparison group</p> <p>Sampling Size:</p>				
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		122 pregnant women				
Patrick, S. W., Dudley, J., Martin, P. R., Harrell, F. E., Warren, M. D., Hartmann, K. E., ... Cooper, W. O. (2015). Prescription Opioid Epidemic and Infant Outcomes. <i>Pediatrics</i> , 135(5), 842–850. <a href="https://doi.org/10.1542/peds.2014-3299">https://doi.org/10.1542/peds.2014-3299</a>	<p>Purpose Statement: “to identify neonatal complications associated with antenatal opioid pain reliever exposure and to establish predictors of neonatal abstinence syndrome (NAS).” (p. 1)</p> <p>Research question: Is the use of opioid painkillers during pregnancy associated with negative neonatal outcomes like neonatal abstinence syndrome?</p>	<p>. Setting: “prescription and administrative data linked to vital statistics for mothers and infants enrolled in the Tennessee Medicaid program between 2009 and 2011” (p. 1). Sampling method: “Maternal and infant dyads were included in the study if: (1) the mother was 15 to 44 years old at the time of delivery; (2) the mother had been enrolled in TennCare at least 30 days before delivery; and (3) the infants were enrolled in TennCare within 30 days after delivery. Last menstrual period and date of delivery were obtained from vital records.<sup>17</sup> Pregnancies were</p>	<p>Design: “retrospective, longitudinal cohort study</p> <p>Level of Evidence: Level III</p>	<p>Findings: “Of pregnant women, 28% filled one or more opioid prescription. Women prescribed opioid pain relievers were more likely than those not prescribed opioids to have depression (5.3% vs 2.7%), anxiety disorder (4.3% vs 1.6%) and to smoke tobacco (41.8% vs 25.8%). Infants with NAS and opioid-exposed infants were more likely than unexposed infants to be born at a low birth weight (21.2% vs 11.8% vs 9.9%). In a multivariable model, higher cumulative opioid exposure for short-acting preparations (P , .001), opioid type (P , .001), number of daily cigarettes smoked (P , .001), and selective serotonin reuptake inhibitor use (odds ratio: 2.08 [95% confidence interval: 1.67–2.60]) were associated with greater risk of developing NAS.” (p. 1)</p> <p>Conclusion:” Prescription opioid use in pregnancy is common and strongly associated with neonatal</p>	<p>Practice and Research Implications: “Prescription opioid use in pregnancy is common and strongly associated with neonatal complications. Antenatal cumulative prescription opioid exposure, opioid type, tobacco use, and selective serotonin reuptake inhibitor use increase the risk of neonatal abstinence syndrome” (p. 6).</p>	<p>Limitations: Due to the use of hospital administrative and vital statistics data, errors of omission, and commission are possible, leading to misclassification bias; however, the medical record review suggested that potential misclassification of outcomes was likely to be small. There was no direct observation of women in our cohort taking the prescribed OPR. It is possible that OPR medications were not taken as prescribed, resulting in a bias toward the null hypothesis. Inability to capture other exposures (eg, illicit drugs) that may have influenced the primary outcome (NAS). Opioids obtained by other legal sources not paid for by TennCare (ie, cash payments) were not captured in the sample, which could bias the results toward the null hypothesis.</p>



		<p>included if the birth occurred between January 1, 2009, and December 31, 2011. Of a total 134450 births, 11202” (p. 2).</p> <p>Sample size: 112029 pregnant mothers</p>		<p>complications. Antenatal cumulative prescription opioid exposure, opioid type, tobacco use, and selective serotonin reuptake inhibitor use increases the risk of NAS” (p. 1).</p> <p>.</p>		<p>Conversion to morphine milligram equivalents may not create perfect comparisons of various OPRs. It is possible that opioid prescribing is a surrogate for other unmeasured risk factors for NAS; residual confounding cannot be completely ruled out.</p>
<p>Rendall-Mkosi, K., Morojele, N., London, L., Moodley, S., Singh, C., &amp; Girdler-Brown, B. (2013). A randomized controlled trial of motivational interviewing to prevent risk for an alcohol-exposed pregnancy in the Western Cape, South Africa. <i>Addiction</i>, 108(4), 725-732. doi: 10.1111/add.1208</p>	<p>Purpose Statement: “To test the effectiveness of motivational interviewing (MI) to reduce the risk of an alcohol exposed pregnancy (AEP) in a high-risk population.” (p.1)</p>	<p>Setting: “Rural population in the Western Cape, South Africa.” (p.1)</p> <p>Sampling methods: “Participants were recruited from six primary care clinics and from farms within the study area between June and November 2007. Eligibility criteria included: (i) age 18–44 years; (ii) not pregnant; (iii) engaged in risky drinking (defined under Measures); (iv) ineffective or no contraceptive use (defined under</p>	<p>Design: “Randomized control trial.” (p.1)</p> <p>Level of evidence: Level II</p>	<p>Findings: “There was a significant difference in the decline in the proportion of women at risk for an AEP in the MI group at 3 months (50 versus 24.59%; <math>P = 0.004</math>), maintained at 12 months (50.82 versus 28.12%; <math>P = 0.009</math>)” (p.1)</p>	<p>Practice and Research Implications: “There were potential biases in this study. There are limitations with relying on self-reported data. In addition, the failure to use a timeline follow-back method to assess the women’s alcohol consumption may have reduced the reliability of self-reports. Interview fatigue may have influenced them to answer what they thought the fieldworker would prefer to hear” (p. 7)</p>	<p>Limitations: There was a small sample size, limited to a rural setting in Africa.</p>

		Measures); (v) had not undergone sterilization or hysterectomy;(vi) had vaginal sex in the past 3 months; and resided within a 25-km radius of the main town.” (p.2) Random sampling. Sample size: “A total of 165 women aged 18–44 years at risk of AEP” (p.1)				
Savory, J., Couves, J., & Burns, E. (2014). Alcohol consumption during pregnancy: Cross-sectional survey. <i>Midwifery</i>	Purpose Statement: “ to assess the prevalence and pattern of alcohol consumption pre-conception and/or during the first trimester using the Alcohol Use Disorders Identification Test (AUDIT), Alcohol Use Disorders Identification Test – Consumption (AUDIT-C) and	Setting: two antenatal clinics in the south west of England Sampling methods: Sample size: 500 pregnant women attending their first antenatal appointment at approximately 10-11 weeks gestation	Design: Cross sectional survey . Level of Evidence: Level III	Findings: quarter of women reported drinking alcohol despite being aware they are pregnant. Between two to three in every 100 women reported drinking six or more units on a single occasion at least monthly or weekly in the past three months, Conclusion: these women were willing to complete brief alcohol screening questionnaires. Minority of the women reported drinking preconception and or during the first trimester with a small percentage	Practice & Research Implications: Use of these questionnaires would help midwives gather info about alcohol are used to help identify women drinking at levels in excess of recommended limits so that appropriate advice and support can be offered.	Limitations of Findings: Alcohol intake was self-reported by women and therefore they may be underreporting due to social stigma. They found difficulties with people’s perceptions of what constitutes a drink. Estimating quantity and frequency of alcohol consumed is difficult due to lack of understanding about alcohol units and is dependent on glass size and drink strength.

	T-ACE (Tolerance, Annoyance, Cut Down and Eye-Opener) alcohol screening questionnaires, and determine the socio-demographic predictors of drinking in this time period” (pg 1) Research Questions: What is the prevalence of alcohol during pregnancy?			drinking at levels potentially harmful to the fetus.		
Warshak, C.R., Regan, J., Moore, B., Magner, K., Kritzer, S., & Van Hook, J. (2015). Association between marijuana use and adverse obstetrical neonatal outcomes. <i>Journal of Perinatology</i>	Purpose Statement: “To evaluate associations between marijuana exposure and adverse outcomes excluding women with polysubstance abuse and stratifying for concurrent maternal tobacco use” (p. 1)	Setting: The University of Cincinnati Medical Center between January 2008 and January 2011  Sampling methods: Marijuana users were designated as such if they reported use during the course of their prenatal care or at the time of delivery or if at any point during the pregnancy they	Design: retrospective cohort study  Level of Evidence: Level IV	Finding: nonusers: n=6107 (94.4%) users: n=361 (5.6%). marijuana users tended to be slightly younger than nonusers, 24 years versus 25.3 years. Marijuana users had clinically similar gestational ages at presentation for prenatal care. Did not find increased risks of several adverse obstetric outcomes in marijuana users versus non users including preterm delivery, pre-eclampsia, or unplanned cesarean delivery. Marijuana users had a lower rate of	Practice & Research Implications: They had a large number of women included in their analysis and their ability to control the confounding medical and social factors (race, obesity and lack of adequate prenatal care) Rates of marijuana use are comparable to those generally reported and therefore they likely had reasonable ascertainment of use from the medical record.	Limitations of Findings: The authors declare no conflict of interest. Their study was not designed to determine dose-related effects and patients were characterized simply as users or nonusers although it is physiologically plausible that there may be differences in outcomes based upon increased use. There center is a high risk academic center with a large referral base and as such

	<p>Research Question: Is there an association between marijuana use and adverse obstetrical and neonatal outcome?</p>	<p>had a positive toxicology screen for tetrahydrocannabinol universal drug screening was not used during the study period but was performed in pregnancies deemed to be high risk for substance abuse, secondary to known history of substance abuse, poor prenatal care or social/medical risk factors for drug abuse.</p> <p>Sample size: 6468 pregnant women (6107 nonusers, 361 users of marijuana)</p>		<p>gestational diabetes and a lower rate of induction.</p> <p>Conclusion: Study did not find significant increases in these outcomes in women who also smoked tobacco.</p>		<p>our rates of exposures and outcomes may vary from other regions. They only reported on outcomes to neonatal discharge. There is consistent data that marijuana exposure during pregnancy and breastfeeding contributes of long term cognitive gross motor and neurodevelopmental impairments in the offspring of these women</p>
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